

## P/ INT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 14 May 2001 (14.05.01)	
<b>International application No.</b> PCT/NO00/00307	<b>Applicant's or agent's file reference</b> 112367Fjo1he
<b>International filing date (day/month/year)</b> 19 September 2000 (19.09.00)	<b>Priority date (day/month/year)</b> 20 September 1999 (20.09.99)
<b>Applicant</b> CHRISTENSEN, Kjell	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

06 April 2001 (06.04.01)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<b>The International Bureau of WIPO</b> 34, chemin des Colombettes 1211 Geneva 20, Switzerland	<b>Authorized officer</b>  G. Bähr
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**PCT REQUEST**

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0	<b>For receiving Office use only</b>	
0-1	International Application No.	PCT/NO 0 0 0 0 3 0 7
0-2	International Filing Date	19 SEPT. 2000 (19.09.00)
0-3	Name of receiving Office and "PCT International Application"	 <b>PATENTSTYRET</b> <small>Offentlig rett for patenter og varemærker</small> PCT International Application
0-4	<b>Form - PCT/RO/101 PCT Request</b>	
0-4-1	Prepared using	PCT-EASY Version 2.91 (updated 01.07.2000)
0-5	<b>Petition</b> The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	<b>Receiving Office (specified by the applicant)</b>	Norwegian Patent Office (RO/NO)
0-7	<b>Applicant's or agent's file reference</b>	112367Fjo1he
I	<b>Title of invention</b>	WHIRLPOOL
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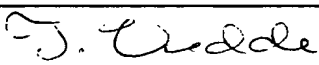
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IV-1	<b>Agent or common representative; or address for correspondence</b> The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	<b>agent</b>
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V	<b>Designation of States</b>	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AG AL AM AT (patent and utility model) AU AZ BA BB BG BR BY BZ CA CH&LI CN CR CU CZ (patent and utility model) DE (patent and utility model) DK (patent and utility model) DM DZ EE (patent and utility model) ES FI (patent and utility model) GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR (patent and utility model) KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK (patent and utility model) SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

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V-5	<b>Precautionary Designation Statement</b> In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.	
V-6	<b>Exclusion(s) from precautionary designations</b>	NONE
VI-1	<b>Priority claim of earlier national application</b>	
VI-1-1	Filing date	20 September 1999 (20.09.1999)
VI-1-2	Number	19994567
VI-1-3	Country	NO
VI-2	<b>Priority document request</b> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1
VII-1	<b>International Searching Authority Chosen</b>	Swedish Patent Office (ISA/SE)
VIII	<b>Check list</b>	number of sheets      electronic file(s) attached
VIII-1	Request	4      -
VIII-2	Description	8      -
VIII-3	Claims	3      -
VIII-4	Abstract	1      112367_sammendrag.txt
VIII-5	Drawings	3      -
VIII-7	TOTAL	19
	<b>Accompanying items</b>	paper document(s) attached      electronic file(s) attached
VIII-8	Fee calculation sheet	✓      -
VIII-9	Separate signed power of attorney	✓      -
VIII-16	PCT-EASY diskette	-      diskette
VIII-17	Other (specified):	Search Report      -
VIII-18	<b>Figure of the drawings which should accompany the abstract</b>	1
VIII-19	<b>Language of filing of the international application</b>	Norwegian
IX-1	<b>Signature of applicant or agent</b>	
IX-1-1	Name	ONSAGERS AS
IX-1-2	Name of signatory	Toril Vedde
IX-1-3	Capacity	Patent Administrator

## FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	19 SEPT. 2000 (19.09.00)
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10-2	Drawings:	
10-2-1	Received	<i>Received</i>
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	<b>ISA/SE</b>
10-6	Transmittal of search copy delayed until search fee is paid	

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11-1	Date of receipt of the record copy by the International Bureau	<b>13 OCTOBER 2000</b>	<b>( 13. 10. 00 )</b>
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A

Fig. 1

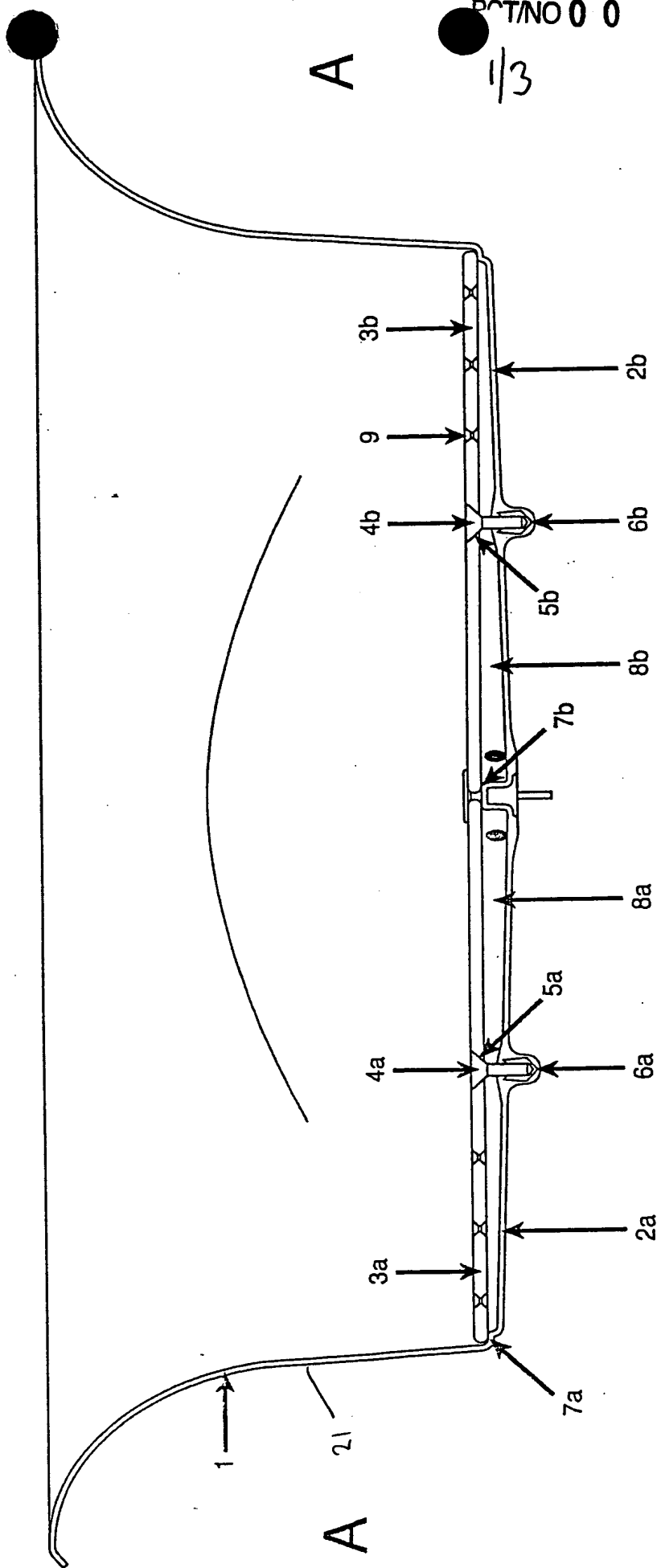


Fig. 2

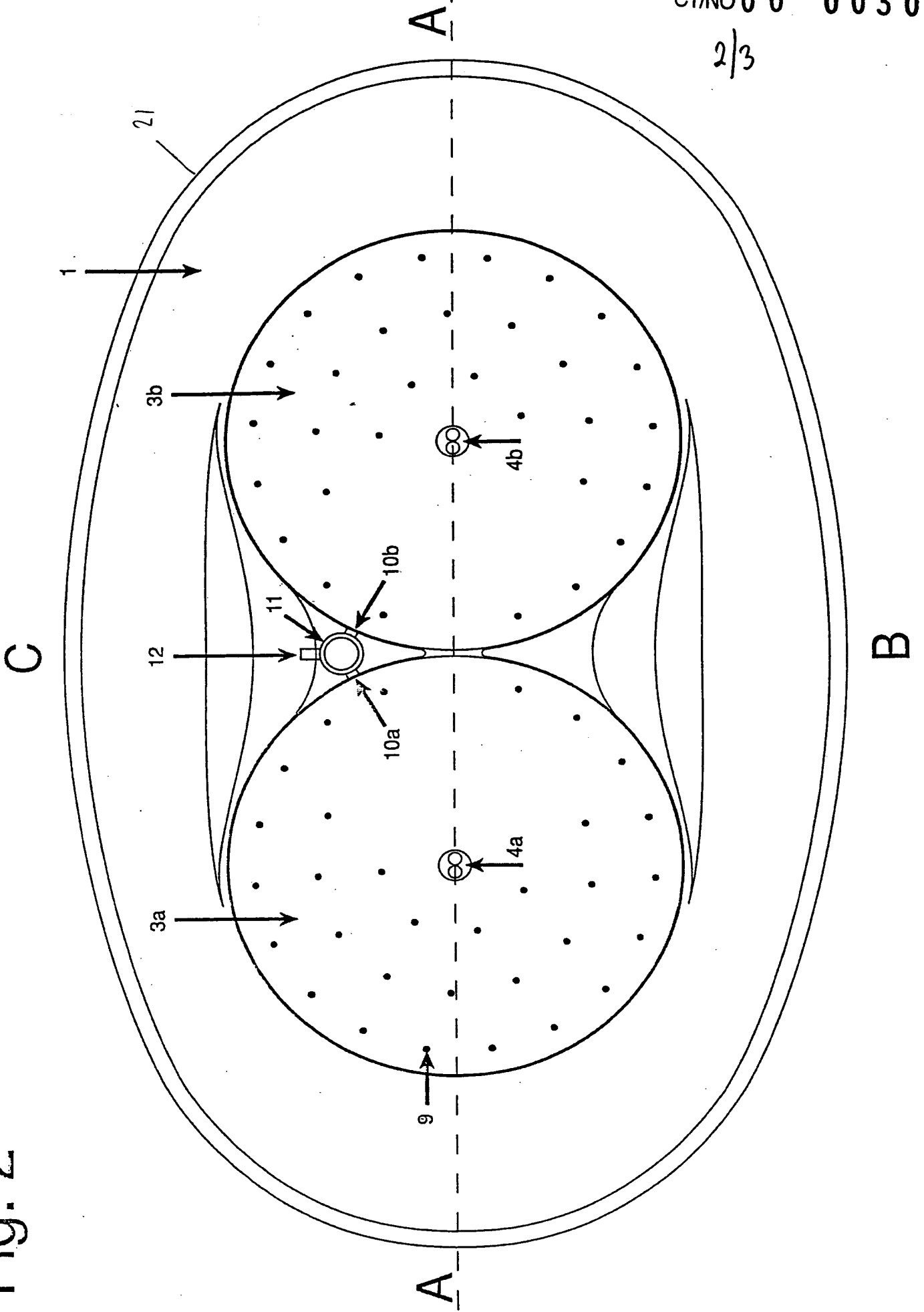
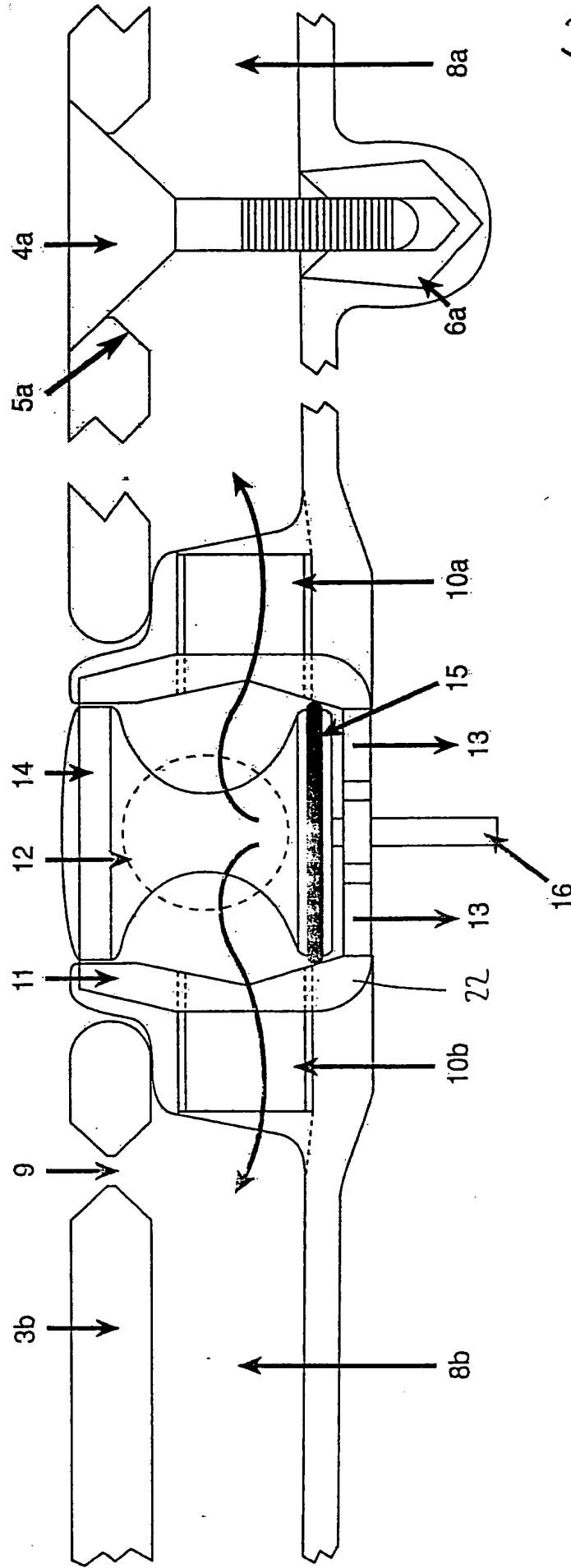


Fig. 3





## Boblebad

Oppfinnelsen angår et boble- eller massasjebadekar, omfattende en kardel med en bunn som er forsynt med gjennomstrømningsåpninger for tilførsel av luft til vann i boblebadekaret, og med innretninger for tilførsel av luft til  
5 gjennomstrømningsåpningene.

Oppfinnelsen vedrører også en ventilinnretning for et boblebadekar, for tilførsel av luft til boblebadekaret og uttapping av vann fra boblebadekaret.

Boble- eller massasjebadekar er i hovedsak basert på to prinsipper: Hydromassasje, der vannstråler sendes ut fra karetts vegger, og luftsystemer, hvor vannet i karet  
10 settes i bevegelse av luftbobler som tilføres fra karetts bunn, eventuelt også vegger. Det er også tatt i bruk kombinasjoner av disse to prinsippene.

Boble- eller massasjebadekar bygget på disse prinsippene har tradisjonelt resultert i løsninger der vann eller luft tilføres fra en pumpeanordning, gjennom et system av slanger eller rør, til dyser anbrakt i bunnen eller veggene av karet.

15 Det er store ulemper forbundet med slike løsninger. Den viktigste innvendingen er renholdet. Et system av slanger eller rør danner grunnlag for såkalt biofilm, som resulterer i vekst av alger, bakterier og sopp, og et slik system er vanskelig tilgjengelig for rengjøring. Sirkulerende vann tilsatt rensevæsker kan tildels  
20 avhjelpe dette problemet, men en mer fullstendig rengjøring krever tilgang til mekanisk vask med børster eller liknende, noe som har vist seg besværlig eller umulig å få til med de lukkede slange- eller rørsystemene.

Et viktig krav til boble- eller massasjebadekar er at de bør kunne fremstilles av/med enkle, kostnadseffektive materialer, komponenter og fremgangsmåter. Et kar basert på utstrakt bruk av slanger og rørforbindelser oppfyller ikke dette kravet.

25 Det er tidligere kjent et boble- eller massasjebadekar hvor enkelte av de ovenstående ulempene tildels er overvunnet. På markedet finnes et boble- eller massasjebadekar under navnet Hurricane (bl.a. vist i produktbrosjyren "-det eneste vaskbare..." fra Fjordbad AS, datert 1. februar 1998). Dette badekaret er et boblekar der det fra en pumpeanordning tilføres luft til dyser anbrakt i bunnen  
30 av karet. Imidlertid er ikke pumpeanordningen forbundet til dysene ved hjelp av slanger eller rør. I stedet er karet utstyrt med et uttakbart, øvre bunnelement i form av en plate, tilpasset formen like over badekarets bunn, der dysene utgjøres av åpninger i det øvre bunnelementet. Det øvre bunnelementet danner sammen med selve karetts bunn et avgrenset kammer hvortil det tilføres luft fra  
35 pumpeanordningen. Under drift settes kammeret under høyere lufttrykk enn atmosfæretrykket, og luften fordeles til de enkelte dysene, der den strømmer ut og

frembringer boble- og massasjevirkning i vannet i karet, på oversiden av det uttakbare bunnelementet.

- 5 Denne løsningen tilveiebringer mer effektive muligheter for renhold. Det øvre bunnelementet kan tas ut av karet ved hjelp av fire skruer, hvorefter de delene av karet og bunnelementet som til sammen utgjør det indre av kammeret, effektivt kan rengjøres med enkle midler og med god tilgjengelighet.

Denne kjente løsningen overvinner mange av de nevnte ulempene knyttet til renhold, men den har samtidig vist seg å innebære nye problemer.

- 10 Et vesentlig problem er de produksjonstekniske vanskelighetene som er forbundet med å tilvirke et uttakbart bunnelement som skal være eksakt tilpasset badekarets form, og som skal gi god tetning til den nedre del av karetts vegger mens kammeret under bunnelementet er satt under lufttrykk fra pumpeanordningen. Dette problemet kan løses ved bruk av pakninger, men en slik løsning bør unngås, da den kan skape nye problemer med vekst av bakterier og liknende i tilknytning til
- 15 pakningen. Fremstilling av et hardt, øvre bunnelement som gir god tetting uten bruk av pakninger, har vist seg å kreve kompliserte og kostbare fremstillingsprosesser, som blant annet er avhengig av utstrakt bruk av manuelt håndverksarbeid.

- 20 Et annet problem ved den kjente løsningen, er at det uttakbare, øvre bunnelementet er tungt og relativt besværlig for brukeren å løsne og løfte ut. Det kjente, øvre bunnelementet har en vekt av 13 kg, og må løsnes med 4 skruer, for deretter å løftes ut ved hjelp av et særlig verktøy i form av en løftering. Denne omstendelige prosessen har medført en tendens til at karet i mange tilfeller likevel ikke blir rengjort så ofte og så grundig som det var tilsiktet.

- 25 En ytterligere ulempe ved den kjente løsningen er at bunnelementet nødvendigvis vil ha en fast, forhåndsbestemt fordeling av luftåpninger over bunnelementets overflate. Dette gir ikke mulighet for at en bruker kan velge å variere hvilke områder som skal være forsynt med luftåpninger, og hvilke områder som ikke skal være det.

- 30 Den kjente løsningen innebærer også at det er besværlig og dyrt å bytte ut bunnelementet med et annet, dersom det er ønskelig å endre visse egenskaper slik som antallet, størrelsen og fordelingen av luftåpninger for bunnelementet.

Den foreliggende oppfinnelsen har til hensikt å tilveiebringe et boblebadekar som nevnt innledningsvis, som ikke er beheftet med de ovenstående ulempene.

Hensikten oppnås med et et boblebadekar og en ventilinnretning av den innledningsvis nevnte art, som er kjennetegnet ved de trekk som er angitt i kravene.

Oppfinnelsen skal i det følgende beskrives nærmere med henvisning til tegningene, der

fig. 1 viser et tverrsnitt av et badekar i samsvar med oppfinnelsen, lagt langs snittlinjen A-A på fig. 2

fig. 2 viser i grunnriss et badekar i samsvar med oppfinnelsen, og

fig. 3 viser en ventilinnretning for bruk med et badekar, i samsvar med oppfinnelsen.

Figur 1 viser et tverrsnitt av et badekar 1 i samsvar med oppfinnelsen. Karet 1 består av en kardel 21 som omfatter vegger og en bunn 2 med to fordypninger 2a og 2b. Hver fordypning er avgrenset og omgitt av en fortrinnsvis avrundet kant eller rand, betegnet henholdsvis 7a og 7b, som hver har i det minste et i hovedsak horisontalt, øvre parti. Det i hovedsak horisontale partiet har med fordel en bredde i horisontal retning i intervallet 3 mm til 10 mm, og særlig foretrukket om lag 5 mm.

Kardelen 21 er fortrinnsvis formstøpt av et kunststoffmateriale, helst glassfiberarmert polyester, men den kan alternativt være fremstilt på andre kjente måter som f.eks. ved vakuumforming av platemateriale, for eksempel akryl. I den viste, foretrukkede utførelsen er fordypningene 2a, 2b sirkelrunde og like store. Selv om den sirkelrunde formen gir særlige fordeler, kan fordypningene innenfor oppfinnelsens ramme gjerne ha en annen form. Fordypningene kan ha forskjellige størrelser, og antallet av dem kan være forskjellig fra to.

Fordypningene er innrettet for å dekkes av to bunnelementer eller bunnelementer 3a og 3b. Når bunnelementene 3a, 3b er anbrakt for å dekke fordypningene 2a og 2b, ligger hvert bunnelement 3a, 3b tett an mot det horisontale, øvre partiet av kantene henholdsvis 7a og 7b som omgir fordypningene. Bunnelementene 3a, 3b er utført med en form tilsvarende fordypningenes kanter 7a, 7b, og er noe større enn fordypningene 2a, 2b, slik at de når de er plassert over fordypningene 2a, 2b avgrenser kamre 8a, 8b. Tilpasningen i radial retning mellom bunnelementene og kantene som omgir fordypningene krever ikke spesielt høy presisjon, da den ikke er avgjørende for tetningen mellom bunnelementene og fordypningenes kanter 7a, 7b. Derimot kreves at bunnelementene og kantene som omgir fordypningene begge er plane, noe som er langt enklere å oppnå enn en eksakt tilpasning mellom kanten og bunnelementenes form i radial retning.

Bunnelementene er utstyrt med hvert sitt hull 5a, 5b for innfesting, idet en skrue 4a, 4b anbringes gjennom hvert hull og skrues inn i gjengede festeanordninger 6a, 6b i kardelens 21 bunn. I den viste utførelsen omfatter festeanordningene gjengede hylser 6a, 6b, for eksempel av messing, støpt inn i kardelens 21 bunn. Hullene 5a, 5b i hvert bunnelement 3a, 3b befinner seg fortrinnsvis i senter av bunnelementet. Skruene 4a, 4b er med fordel utført i et plastmateriale, og de har helst et hode som er tilpasset forsenkninger i hullene 5a, 5b. Skruenes hode er med fordel utstyrt med midler for manuell påvirkning uten bruk av verktøy, som for eksempel fordypninger tilpasset to fingre. Skruene kan imidlertid være av en annen egnet type eller materiale, eller det kan alternativt benyttes andre, i og for seg kjente tilfestingsmidler som bringer bunnelementene i løsbar, tett forbindelse med kantene 7a, 7b rundt bunnens fordypninger 2a, 2b.

Bunnelementene er videre utstyrt med et antall åpninger 9 som utgjør luftdyser der luft under trykk fra kamrene 8a, 8b tilføres vannet i karet. Ved å variere åpningenes størrelse og/eller antall, kan oppnås ulike egenskaper for massasjevirkningen som frembringes med åpningene når badekaret anvendes. I en foretrukket standardutførelse, som gir normal massasjeeffekt, har hvert bunnelement 28 åpninger, hver med diameter 6 mm. I en alternativ utførelse, som gir mykere massasjeeffekt, har hvert bunnelement 63 åpninger, hver med diameter 4 mm. Ved 10 åpninger, hver med diameter 10mm, oppnås vesentlig hardere massasje. Ved bruk av et alternativt antall åpninger er det en fordel å tilpasse arealet for hver åpning, slik at det totale arealet av alle åpningene er tilnærmet konstant. Dette skyldes at det er ønskelig med et optimalt, ikke for høyt overtrykk i kammeret under bunnelementet. Dette skyldes igjen at et slikt overtrykk fører til uønsket temperaturreduksjon for luften når den forlater kammeret og slipper ut i vannet. Desto større trykkforskjell mellom kammeret og omgivelsene, desto større blir temperaturreduksjonen.

Formen på åpningene 9 er fortrinnsvis sirkulær, men andre i og for seg kjente former for dyseåpninger kan benyttes. Det kan om ønskelig anbringes i og for seg kjente innsatser i åpningene, for eksempel i form av et paraplyformet deksel over åpningen, for oppnåelse av spesielle luftstrømnings- eller massasjeeffekter. Av hensyn til effektivt renhold og total ytelse og komfort benyttes imidlertid fortrinnsvis sirkulære åpninger og ingen slike innsatser.

Åpningene 9 kan være fordelt over hovedsakelig hele bunnelementet 3a, 3b. Luftdyser/åpninger 9 som er anbrakt direkte i kontakt med bestemte legemsdeler, særlig underlivet, hos en bruker av badekaret, kan imidlertid medføre ubehag eller ulempe for brukeren. Derfor er det en fordel å utelate åpninger på et område av bunnelementet 3a, 3b, slik det fremgår av fig. 2. I et slikt tilfelle er det ved

innsetting av bunnelementene 3a, 3b mulig å velge hvilke områder av karetts totale bunn som skal være uten åpninger 9. Dette gjøres ved å dreie hvert bunnelement 3a, 3b til en ønsket vinkelposisjon over fordypningen 2a, henholdsvis 2b, i horisontalplanet. Dette er mulig fordi bunnelementene 3a, 3b er sirkulære, og fordi tilfestingshullene 5a, 5b er anbrakt i senter av bunnelementene.

Det horisontale partiet av randen som omgir hver fordypning, er i den illustrerte utførelsen i fig. 1 helt plant. Dersom at bunnelementet forskyves noe ut fra sin senterposisjon, og den avrundede kanten av bunnelementet derved støter mot et krummet parti av veggen til kardelen, kan resultatet bli at bunnelementet løfter seg noe fra sitt leie, og lekkasje kan oppstå. Dersom krumningen for bunnelementet og det krummede partiet av veggen til kardelen er utformet eksakt samsvarende, vil dette problemet ikke inntreffe, men i praksis bør det ikke være for store toleransekrav til tilpasningen mellom de nevnte krumninger.

For å forhindre den ovennevnte situasjonen, er det horisontale partiet av randen som omgir hver fordypning i en alternativ utførelse (ikke vist) i tillegg forsynt med en forhøyet rygg eller kam som forløper langs hele randen som omgir fordypningen. Ryggen har med fordel en høyde mellom 0.2 og 2.0 mm, og særlig foretrukket om lag 1.0 mm. Ryggen har videre en bredde i intervallet 4 til 8 mm, og særlig foretrukket om lag 6 mm. Den forhøyede ryggens øvre tverrsnittsflate er avrundet, og har med fordel tilnærmet fasong av en sirkelbue. Denne alternative utførelsen fører til at bunnelementet, dersom det forskyves noe ut fra sin senterposisjon, støter mot et loddrett parti av veggen av kardelen, og ikke mot nevnte krummede parti. Dette bidrar derfor til ytterligere å forhindre lekkasje mellom randen og bunnelementet.

Figur 2 viser i grunnriss et boblebadekar 1 i samsvar med oppfinnelsen, sett ovenfra, hvor en ventilinnretning 11 i tilknytning til den nedre bunnen av karet også er illustrert, selv om den egentlig befinner seg innbakt i kardelen 21 og således i realiteten ikke er synlig. På figur 2 er det antydnet en linje A-A som angir snittet som er vist i figur 1, og angivelsen B angir hvilken retning figur 1 er sett fra. Ventilinnretningen 11 skal tjene til tilførsel av et første fluid til kamrene 8a, 8b og tømning av et andre fluid fra karet til et avløp. Ventilinnretningen 11 har et innløp 12 for et første fluid, som vanligvis er luft. Under drift av boblebadekaret fordeler ventilinnretningen 11 luften til to utløp 10a, 10b, som overfører luften til kamrene 8a, 8b. Innløpet 12 og utløpene 10a, 10b består av rør med sirkulært tverrsnitt, som av de grunner som er nevnt innledningsvis om skadelig dannelse av alger, bakterier osv., bør gjøres så korte som mulig. Ventilinnretningen 11 er derfor anbrakt i kort avstand fra de to kamrene 8a, 8b, og samtidig helst i kort avstand fra en pumpeanordning (ikke vist). Særlig viktig er det at en i hovedsak horisontal del

av forbindelsen mellom pumpeanordningen og inntaket 12 gjøres så kort som mulig, fordi problemet med avleiringer og beleggdannelse er størst i horisontale partier av slike forbindelser.

5 På figur 1 er det antydnet at karet 1 i overkant kan ha en oval form, men andre egnede utforminger er like aktuelle, for eksempel nyreformet, superelliptisk, eggformet, sekskantet, rektangulært, rektangulært med en eller to konvekst buede sider, eller rektangulært med avrundede hjørner. I det tilfelle at karet er utstyrt med mer enn to fordypninger og bunnelementer, for eksempel tre, kan karet overkant for eksempel anta form som en sirkel, en trekløverform, en trekant, en trekant med 10 avrundede hjørner, en kvartsirkel eller en kvartsirkel med avrundet hjørne. I sin enkleste form har karet bare en fordypning og ett bunnelement.

De ovenstående eksemplene forutsetter at fordypningene med tilhørende bunn- elementer ligger i hovedsak i samme horisontale plan. Oppfinnelsen er imidlertid ikke begrenset til slike utførelser. I en særlig utførelse kan karet omfatte fem 15 fordypninger med tilhørende bunnelementer, hvorav fire er perifert anbrakt i et første, øvre horisontalplan i et firkløvermønster, slik at fordypningenes sentra danner hjørnene i et kvadrat, mens den femte fordypningen er sentralt anbrakt i et andre, lavere beliggende horisontalplan, symmetrisk midtstilt mellom de fire førstnevnte. Et slikt kar er velegnet for samtidig bruk av fire personer, idet de fire 20 førstnevnte bunnelementene utgjør sitteplasser, mens det nedre, femte bunn- elementet utgjør en sentral nedsenkning for de badendes føtter. I dette tilfellet må det tilveiebringes kanaler for transport av fluid, både luft og vann, mellom hver av de fire perifere fordypningene og den femte, sentrale fordypningen. Slike kanaler kan medføre en risiko for dannelse av uønsket belegg, og de må derfor gjøres så 25 korte som mulig, og samtidig så store i tverrsnitt at de blir lett tilgjengelige for mekanisk rengjøring f.eks. med børster. En ventilinnretning for både tilførsel av luft fra en pumpeanordning og for tømning av vann fra karet, er i dette tilfellet anbrakt i den femte, sentrale fordypningen.

For enhver utførelse av karet kan bunnelementene med fordel være utført i et 30 kunststoffmateriale, og fortrinnsvis i et helt eller delvis transparent materiale. Ved materialvalget bør man blant annet ta hensyn til at bunnelementene skal kunne utstå lufttrykket og endringer i lufttrykket inne i kamrene ved gjentatte oppstarter og over lang tid, uten at det oppstår lekkasjer mellom bunnelementene og kantene 7a, 7b som omgir fordypningene 2a, 2b. Materialet må være forholdsvis stivt, slik 35 at det ikke gir for mye etter under vekten av badende personer. Man bør ved materialvalget også ta hensyn til at vekten av bunnelementene ikke må bli for høy, og naturligvis må materialet være tett for det anvendte fluid, det vil vanligvis si vanntett, og ha motstandsdyktighet mot fluidet og eventuelle tilsetningsstoffer til

fluidet. Anvendelse av et helt eller delvis transparent materiale er ikke bare estetisk begrunnet, men har den tekniske virkning at det blir lettere å observere når kamrene bør rengjøres. Basert på disse hensyn er klar eller tonet akryl funnet å være et foretrukket materiale.

- 5 Figur 3 viser en utførelse av ventilinnretningen 11 i nærmere detalj, sett fra siden C i fig. 2. Ventilinnretningen 11 har to funksjoner. Dels skal den motta et første fluid, vanligvis luft, fra inntaket 12, vist med stiplet sirkel, og fordele det første fluid til uttakene 10a, 10b for tilførsel til kamrene 8a, 8b. Dels skal ventilinnretningen 11 tjene som en tømmeventil for et andre fluid, vanligvis vann, fra badekaret 1 til et avløp 13 for det andre fluidet. Ventilinnretningen omfatter et hus 22, utstyrt med et første, i hovedsak horisontalt inntak 12 for det første fluidet, minst to i hovedsak horisontale uttak 10a, 10b for det første fluidet, et øvre, vertikalt inntak for det andre fluidet, og et nedre, vertikalt avløp 13 for det andre fluidet. Huset 22 har ved avløpet 13 en konisk utforming som danner et ventilsete. 15 Inne i huset er det anbrakt en lukkeinnretning 14 som rundt en nedre del omfatter en tetning 15, fortrinnsvis i form av en O-ring. Lukkeinnretningen 14 er forbundet med en løfteinnretning 16 som kan forflytte lukkeinnretningen fra en lukket, nedre stilling til en åpen, ikke vist øvre stilling. Løfteinnretningen 16 kan betjenes av en person som benytter badekaret, ved hjelp av i og for seg kjente, ikke viste mekaniske overføringsanordninger, eksempelvis et stag. Lukkeinnretningen 14 med 20 tetningen 15 er anordnet for i lukket tilstand, det vil si i løfteinnretningens nedre stilling, å stenge avløpet 13, slik at det andre fluidet ikke kan passere. I åpen tilstand, det vil si i løfteinnretningens øvre stilling, vil lukkeinnretningen tillate det andre fluidet å passere fra badekaret og ned i avløpet 13.
- 25 Ventilinnretningen 11 kombinerer tilførsels- og tømmefunksjonene for henholdsvis det første og andre fluidet på en særlig effektiv måte, hvor tilførslene for det første fluidet, vanligvis luft, er gjort svært korte. Lukkeinnretningen 14 er vertikalt uttakbar for rengjøring, og når lukkeinnretningen 14 er fjernet, er det enkelt å komme til ventilinnretningens indre deler, inkludert uttakene 10a, 10b, for 30 rengjøring. Derved oppnås et enkelt renhold og liten dannelselse av avleiringer, belegg og så videre.

- I det tilfellet at badekaret er utstyrt med mer enn to fordypninger med tilhørende bunnelementer i kardelen i hovedsak i samme horisontalplan, for eksempel tre fordypninger og tre bunnelementer, vil ventilinnretningen ha et tilsvarende antall 35 uttak for det første fluidet, anbrakt på en egnet måte fordelt rundt ventilinnretningens omkrets, slik at både uttakene og inntaket for det første fluidet blir så korte som mulig.

Ved å utstyre badekar av forskjellig type med to eller flere like store fordypninger, kan samme type bunnelement benyttes i de forskjellige badekar. Dette har som følge at fremstillingen av bunnelementene blir vesentlig enklere og langt mer kostnadseffektiv enn om bunnelementene skulle ha en form tilpasset bunnen i hver type badekar.

Kravene til presisjon for bunnelementenes utforming blir vesentlig redusert, fordi det er langt enklere å oppnå bunnelementer som er plane, enn bunnelementer som har en høy presisjon i radiell retning. I samsvar med oppfinnelsen blir det derved langt enklere å oppnå en tilstrekkelig tilpasning mellom bunnelementet og kantene som omgir fordypningene i den nedre bunnen. Særlig enkel blir tilpasningen i det tilfellet at bunnelementene er sirkelrunde, hvor en festeskrue anbrakt i sentrum av bunnelementet gir en uniformt fordelt kraft langs omkretsen, som medfører en jevn og god tetting. En enkel og kostnadseffektiv fremstilling av bunnelementene har den særlige fordel at bunnelementene enkelt og rimelig kan byttes ut med nye bunnelementer med alternativ utførelse. Slike alternative bunnelementer kan ha samme ytre form, mens andre egenskaper som for eksempel antall, størrelse, utforming og/eller fordeling av dyseåpninger, eller egenskaper knyttet til materiale, overflateutforming eller farge, kan være forskjellig. Ved å utstyre badekaret med to eller flere fordypninger og bunnelementer, oppnås samtidig at en ventilinnretning som beskrevet medfører en effektiv fordeling av det første fluidet til de to kamrene under bunnelementene i karet, med korte tilførselskanaler. Derved unngås de innledningsvis nevnte ulempene som tidligere kjente løsninger er beheftet med.



## PATENTKRAV

1. Boblebadekar, omfattende en kardel med en bunn som er forsynt med gjennomstrømningsåpninger for tilførsel av luft til vann i boblebadekaret, og innretninger for tilførsel av luft til gjennomstrømningsåpningene,  
5 k a r a k t e r i s e r t v e d at bunnen er forsynt med minst en fordypning som strømningsmessig er forbundet med innretningene for tilførsel av luft, at hver fordypning er omgitt av en hovedsakelig horisontal tetningskant, at hver fordypning er dekket av et bunnelement som ligger tettende an mot fordypningens tetningskant, slik at fordypningen og bunnelementet sammen danner  
10 et fordelingskammer for luft, og at bunnelementene er forsynt med gjennomstrømningsåpninger for luft fra tilførselskammerene til vann i boblebadekaret.
2. Boblebadekar i samsvar med krav 1,  
k a r a k t e r i s e r t v e d at den omfatter minst to formlike fordypninger.
- 15 3. Boblebadekar i samsvar med krav 1-2,  
k a r a k t e r i s e r t v e d at tetningskantene og bunnelementene er symmetriske om vertikale akser gjennom fordypningenes midtområder.
4. Boblebadekar i samsvar med krav 1-3,  
k a r a k t e r i s e r t v e d at tetningskantene og bunnelementene er sirkulære.
- 20 5. Boblebadekar i samsvar med krav 1-4,  
k a r a k t e r i s e r t v e d at bunnelementene er forsynt med midtplasserte festeinnretninger for samvirkning med korresponderende festeinnretninger i midtområder av fordypningene.
6. Boblebadekar i samsvar med krav 1-5,  
25 k a r a k t e r i s e r t v e d at bunnelementenes gjennomstrømningsåpninger er anordnet usymmetrisk om de vertikale akser.
7. Boblebadekar i samsvar med krav 1-6,  
k a r a k t e r i s e r t v e d at bunnelementene er dreibare om de midtplasserte festeinnretninger, for dreining av bunnelementene til ønsket posisjon med hensyn på  
30 gjennomstrømningsåpningenes posisjon.
8. Boblebadekar i samsvar med krav 2-7,  
k a r a k t e r i s e r t v e d at de minst to fordypninger får tilført luft fra samme innretning.

9. Boblebadekar i samsvar med krav 1-8,  
karakterisert ved at innretningen for tilførsel av luft er en kombinert  
innretning for tilførsel av luft og uttapping av vann.
10. Boblebadekar i samsvar med krav 1-9, karakterisert ved at  
5 - kardelen er utformet med én fordypning beliggende i et nedre horisontalplan og  
ytterligere et antall fordypninger beliggende i et øvre horisontalplan, og at  
- hver fordypning som er beliggende i det øvre horisontalplanet er fluidmessig  
forbundet med fordypningen i det nedre horisontalplanet med en kanal.
11. Boblebadekar i samsvar med krav 1-10, karakterisert ved at  
10 innretningen for tilførsel av luft og uttapping av vann utgjøres av en  
ventilinnretning som omfatter et hus som er forsynt med et innløp for luft og utløp  
for luft til hver av fordypningene, et innløp for vann fra boblebadekaret og et utløp  
for vann til et avløp, og en ventil for avstenging av utløpet for vann.
12. Ventilinnretning for et boblebadekar, for tilførsel av luft til boblebadekaret  
15 og uttapping av vann fra boblebadekaret,  
karakterisert ved  
- at den omfatter et ventilhus, minst to horisontale utløp for luft, et hovedsakelig  
vertikalt innløp for vann og et hovedsakelig vertikalt utløp for vann,  
- at utløpene for luft er anordnet i et plan mellom innløpet for vann og utløpet for  
20 vann,  
- at den omfatter en ventil for avstenging av utløpet for vann, omfattende et  
hovedsakelig horisontalt ventilsete i huset og et vertikalt bevegelig stengelegeme  
som ved hjelp av en løfteinnretning er bevegelig mellom en åpen stilling hvor vann  
tillates å strømme gjennom ventilinnretningen og en lukket stilling hvor et  
25 utløpsstengeparti av stengelegemet ligger an mot ventilsetet og stenger utløpet for  
vann.
13. Ventilinnretning i samsvar med krav 12,  
karakterisert ved at innløpet og utløpet for vann er hovedsakelig  
koaksiale.
14. Ventilinnretning i samsvar med krav 12-13,  
30 karakterisert ved at stengelegemet også omfatter et  
innløpsstengeparti tilpasset til å stenge eller hovedsakelig stenge innløpet for vann.
15. Ventilinnretning i samsvar med krav 12-14,  
karakterisert ved at stengelegemet har form hovedsakelig av to  
35 avkortede kjegler med de smale ender vendende mot hverandre, idet  
utløpsstengepartiet er anordnet i den brede ende av en nedre kjegle og

innløpsstengepartiet er anordnet i den brede ende av en øvre kjegle, og området med kjeglenes smale ender er anordnet til passering av luft til fordypningene når ventilinnretningen befinner seg i lukket stilling.

## SAMMENDRAG

Oppfinnelsen angår et boblebadekar 1 og en ventilinnretning 11 for et slikt kar. Karet omfatter en støpt kardel 21 og minst ett, fortrinnsvis to uttakbare, sirkelformede bunnelementer 3a, 3b som er tilpasset fordypninger 2a, 2b i kardelen. Bunnelementene kan festes til kardelen ved hjelp av senterskruer 4a, 4b.

Fra en ekstern pumpeanordning tilføres luft til ventilinnretningen 11 og videre til fortrinnsvis to avgrensede kamre 8a, 8b i karet, som hvert utgjøres av en fordypning med tilhørende bunnelement. Hvert bunnelement har åpninger 9 for tilførsel av luft fra kamrene til vannet i badekaret. Ventilinnretningen 11 utgjør samtidig en bunnventil for tømming av vann fra karet til et avløp. Karet er lett å holde rent, og kan dessuten tilvirkes på en enkel og kostnadseffektiv måte.

Fig. 1

(19) World Intellectual Property Organization  
International Bureau



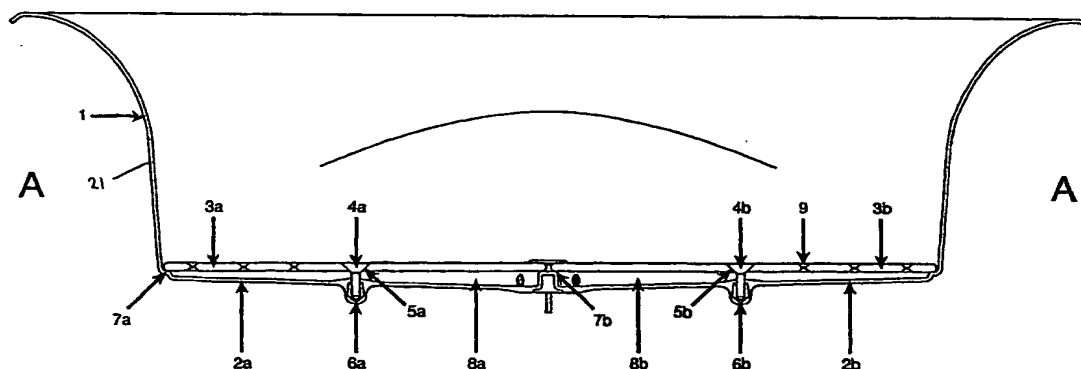
(43) International Publication Date  
29 March 2001 (29.03.2001)

PCT

(10) International Publication Number  
**WO 01/21130 A1**

- (51) International Patent Classification<sup>7</sup>: **A61H 33/02**
- (21) International Application Number: **PCT/NO00/00307**
- (22) International Filing Date:  
19 September 2000 (19.09.2000)
- (25) Filing Language: **Norwegian**
- (26) Publication Language: **English**
- (30) Priority Data:  
19994567 20 September 1999 (20.09.1999) **NO**
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **WHIRLPOOL**



(57) Abstract: The invention relates to a whirlpool bathtub (1) and a valve device (11) for such a tub. The tub comprises a moulded tub part (21) and at least one, preferably two removable, circular bottom elements (3a, 3b) which match recesses (2a, 2b) in the tub part. The bottom elements can be attached to the tub part by means of central screws (4a, 4b). From an external pump device air is supplied to the valve device (11) and on to preferably two defined chambers (8a, 8b) in the tub, each of which is composed of a recess with associated bottom element. Each bottom element has apertures (9) for the supply of air from the chambers to the water in the bathtub. The valve device (11) simultaneously constitutes a bottom valve for draining water from the tub to a plug hole. The tub is easy to keep clean, and may in addition be manufactured in a simple and cost-effective manner.

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## Whirlpool

The invention relates to a whirlpool or massage bathtub, comprising a tub part with a bottom which is provided with through-flow apertures for the supply of air to water in the whirlpool bathtub, and with devices for  
5 supplying air to the through-flow apertures.

The invention also relates to a valve device for a whirlpool bathtub, for supplying air to the whirlpool bathtub and draining water from the whirlpool bathtub.

Whirlpool or massage bathtubs are essentially based on two principles:  
10 hydromassage, where jets of water are ejected from the walls of the tub, and air systems, where the water in the tub is set in motion by air bubbles which are supplied from the bottom of the tub and possibly also the walls. Combinations of these two principles have also been employed.

Traditionally, whirlpool or massage bathtubs based on these principles have  
15 resulted in solutions where water or air is supplied from a pump device, through a system of hoses or pipes, to nozzles mounted in the bottom or the walls of the tub.

There are major disadvantages connected with such solutions. The most important objection is associated with cleaning. A system of hoses or pipes  
20 creates the basis for so-called biofilm, which results in the growth of algae, bacteria and fungi, and in such a system it is difficult to gain access for cleaning. Circulating water with added cleaning fluids can partially redress this problem, but a more thorough cleaning process requires access for mechanical washing with brushes or the like, which has been shown to be  
25 difficult or impossible to accomplish with the closed hose or pipe systems.

An important requirement for whirlpool or massage bathtubs is that they should be able to be manufactured from/with simple, cost-effective materials, components and methods. A tub based on extensive use of hoses and pipe connections does not fulfil this requirement.

30 A whirlpool or massage bathtub is known in the prior art where some of the above drawbacks are partially overcome. On the market there is a whirlpool or massage bathtub by the name of Hurricane (illustrated, e.g., in the product brochure "the only one which is washable..." from Fjordbad AS, dated 1.

February 1998). This bathtub is a whirlpool bath where air is supplied from a pump device to nozzles mounted in the bottom of the tub. However, the pump device is not connected to the nozzles by means of hoses or pipes. Instead, the tub is equipped with a removable, upper bottom element in the form of a plate, matching the shape immediately above the bottom of the bathtub, where the nozzles are composed of apertures in the upper bottom element. Together with the bottom of the actual tub, the upper bottom element forms a defined chamber to which air is supplied from the pump device. During operation the chamber is placed under higher air pressure than atmospheric pressure, and the air is distributed to the individual nozzles, where it flows out, producing a whirlpool and massaging effect in the water in the tub, on the top of the removable bottom element.

This solution offers the possibility of more efficient cleaning. The upper bottom element can be removed from the tub by means of four screws, whereupon those parts of the tub and the bottom element which together form the interior of the chamber can be efficiently cleaned by simple means and with easy access.

This known solution overcomes many of the said disadvantages associated with cleaning, but it has also been shown to involve new problems.

One significant problem is the technical difficulties connected with producing a removable bottom element which will exactly match the shape of the bathtub, and which will provide a tight seal with the lower part of the tub's walls while the chamber under the bottom element is placed under air pressure from the pump device. This problem can be solved by means of gaskets, but this solution should be avoided, since it can create new problems with the growth of bacteria and the like in connection with the gaskets. The manufacture of a hard, upper bottom element which provides a tight seal without the use of gaskets has been shown to require complicated and costly production processes, which depend, amongst other things, on the extensive use of manual craftsmanship.

Another problem with the known solution is that the removable, upper bottom element is heavy and relatively difficult for the user to release and lift out. The known, upper bottom element has a weight of 13 kg, and 4 screws have to be loosened, whereupon it has to be lifted out by means of a special

tool in the form of a lifting ring. This cumbersome process has in many cases led to a tendency for the tub not to be cleaned as often and as thoroughly as was intended.

5 A further drawback with the known solution is that the bottom element will require a fixed, predetermined distribution of air apertures over the surface of the bottom element. This offers no opportunity for a user to select and vary the areas which will be provided with air apertures, and which areas will not.

10 The known solution also makes it difficult and expensive to replace the bottom element with another, if it is desirable to alter certain characteristics such as the number, size and distribution of air apertures for the bottom element.

The object of the present invention is to provide a whirlpool bathtub as mentioned in the introduction, which is not encumbered by the above disadvantages.

15 The object is achieved with a whirlpool bathtub and a valve device of the type mentioned in the introduction, which are characterized by the features which are indicated in the claims.

The invention will now be described in more detail with reference to the drawings, in which

20 fig. 1 illustrates a cross section of a bathtub according to the invention, taken along the intersecting line A-A in fig. 2,

fig. 2 is a top view of a bathtub according to the invention, and

fig. 3 illustrates a valve device for use with a bathtub according to the invention.

25 Figure 1 illustrates a cross section of a bathtub 1 according to the invention. The tub 1 consists of a tub part 21 comprising walls and a bottom 2 with two recesses 2a and 2b. Each recess is bounded and surrounded by a preferably rounded edge or rim, designated by 7a and 7b respectively, each of which has at least one substantially horizontal, upper portion. The substantially  
30 horizontal portion advantageously has a width in the horizontal direction in the range of 3 mm to 10 mm, and specially preferred around 5 mm.



The tub part 21 is advantageously moulded from an artificial fibre material, preferably glass-fibre reinforced polyester, but it may alternatively be made in other known ways such as, e.g., vacuum forming of sheet material, for example acryl. In the illustrated, preferred embodiment the recesses 2a, 2b are circular and of equal size. Even though the circular shape offers special advantages, the recesses may well have a different shape within the scope of the invention. The recesses may have different sizes, and their number may differ from two.

The recesses are arranged to be covered by two bottom elements or bottom elements 3a and 3b. When the bottom elements 3a, 3b are arranged for covering the recesses 2a and 2b, each bottom element 3a, 3b abuts closely against the horizontal, upper portion of the edges 7a and 7b respectively which surround the recesses. The bottom elements 3a, 3b are designed with a shape corresponding to the edges 7a, 7b of the recesses, and are slightly larger than the recesses 2a, 2b, with the result that when they are placed over the recesses 2a, 2b, they define chambers 8a, 8b. The adaptation in the radial direction between the bottom elements and the edges surrounding the recesses does not require a particularly high degree of precision, since it is not crucial for the sealing between the bottom elements and the edges 7a, 7b of the recesses. On the other hand, the bottom elements and the edges surrounding the recesses both require to be flat, which is far easier to achieve than an exact match between the shape of the edges and that of the bottom elements in the radial direction.

Each of the bottom elements is equipped with a hole 5a, 5b for attachment, a screw 4a, 4b being placed between each hole and screwed into threaded attachment devices 6a, 6b in the bottom of the tub part 21. In the illustrated embodiment the attachment devices comprise threaded sleeve 6a, 6b, for example of brass, moulded into the bottom of the tub part 21. The holes 5a, 5b in each bottom element 3a, 3b are preferably located in the centre of the bottom element. The screws 4a, 4b are advantageously made of a plastic material, and they preferably have a head which is adapted to countersinks in the holes 5a, 5b. The head of the screw is preferably equipped with means for manual influence without the use of tools, such as, for example, indentations suitable for two fingers. The screws, however, may be of another suitable type or material, or alternatively use may be made of other, known per se

attachment means for bringing the bottom elements into releasable, sealed connection with the edges 7a, 7b round the bottom's recesses 2a, 2b.

5 The bottom elements are further equipped with a number of apertures 9 which represent air nozzles where air under pressure from the chambers 8a, 8b is supplied to the water in the tub. By varying the size and/or number of apertures, different characteristics can be obtained for the massaging effect which is produced by the apertures when the bathtub is used. In a preferred standard embodiment, which provides a normal massaging effect, each bottom element has 28 apertures, each with a diameter of 6 mm. In an  
10 alternative embodiment, which provides a softer massaging effect, each bottom element has 63 apertures, each with a diameter of 4 mm. With 10 apertures, each with a diameter of 10 mm, a considerably harder massage is obtained. When using an alternative number of apertures it is an advantage to adapt the area of each aperture in such a way that the total area of all the  
15 apertures is approximately constant. This is due to the fact that it is desirable to have an optimal, not excessive overpressure in the chamber under the bottom element. This in turn is due to the fact that such an overpressure leads to undesirable temperature reduction in the air when it leaves the chamber and is discharged into the water. The greater the pressure difference between  
20 the chamber and the surroundings, the greater the temperature reduction.

The shape of the apertures 9 is preferably circular, but other known per se shapes for nozzle apertures may be employed. If so desired, known per se inserts may be placed in the apertures, for example in the form of an  
25 umbrella-shaped cover over the aperture, in order to achieve special air flow or massaging effects. In order to ensure thorough cleaning and overall efficiency and comfort, however, use is preferably made of circular apertures with no such inserts.

The apertures 9 may be distributed over substantially the entire bottom element 3a, 3b. Air nozzles/apertures 9 which are placed directly in contact  
30 with certain body parts, particularly the abdomen, of a user of the bathtub, however, may cause the user discomfort or inconvenience. It is therefore an advantage to omit apertures in an area of the bottom element 3a, 3b, as illustrated in fig. 2. In such a case, when installing the bottom elements 3a, 3b, it is possible to choose which parts of the tub's total bottom area should  
35 be without apertures 9. This is done by rotating each bottom element 3a, 3b

to a desired angular position over the recesses 2a and 2b respectively, in the horizontal plane. This is possible since the bottom elements 3a, 3b are circular, and since the attachment holes 5a, 5b are arranged in the centre of the bottom elements.

5 The horizontal portion of the rim surrounding each recess is completely flat in the illustrated embodiment in fig. 1. If the bottom element is displaced slightly from its centre position, and the rounded edge of the bottom element thereby abuts against a curved portion of the wall of the bathtub, the result may be that the bottom element is slightly raised from its seat, and leakage  
10 may occur. If the curvature of the bottom element and the curved portion of the wall of the bathtub are designed to exactly agree, this problem will not arise, but in practice the tolerance requirements should not be too great for the match between the said curvatures.

In order to prevent the above-mentioned situation, in an alternative  
15 embodiment (not illustrated), the horizontal portion of the rim surrounding each recess is also provided with a raised back or ridge which extends along the entire rim surrounding the recess. The back advantageously has a height between 0.2 and 2.0 mm, and specially preferred around 1.0 mm. The back, moreover, has a width in the range of 4 to 8 mm, and specially preferred  
20 around 6 mm. The raised back's upper cross sectional surface is rounded, and advantageously is approximately in the form of a circular arc. This alternative embodiment results in the bottom element, if it is slightly displaced from its centre position, abutting against a perpendicular portion of the wall of the tub part, and not against the curved portion. Thus further  
25 contributes, therefore, to preventing leakage between the rim and the bottom element.

Figure 2 is a top view of a whirlpool bathtub 1 according to the invention, where a valve device 11 in connection with the lower bottom of the tub is also illustrated, even though it is actually located embedded in the tub part 21  
30 and thus in reality is not visible. In figure 2 a line A-A is shown, indicating the section which is illustrated in figure 1, and the letter B indicates from which direction figure 1 is viewed. The valve device 11 is intended to provide supply of a first fluid to the chambers 8a, 8b and emptying of a second fluid from the tub to a plug hole. The valve device 11 has an inlet 12  
35 for a first fluid, which is usually air. When the whirlpool bathtub is in

operation, the valve device 11 distributes the air to two outlets 10a, 10b, which transfer the air to the chambers 8a, 8b. The inlet 12 and the outlets 10a, 10b consist of pipes with a circular cross section, which for the reasons mentioned at the beginning concerning harmful formation of algae, bacteria, etc., should be made as short as possible. The valve device 11 is therefore mounted at a short distance from the two chambers 8a, 8b, and also preferably at a short distance from a pump device (not illustrated). It is particularly important that a substantially horizontal part of the connection between the pump device and the inlet 12 should be made as short as possible, since the problem of deposits and growth formation is greatest in horizontal portions of such connections.

In figure 1 it is indicated that the top of the tub 1 may have an oval shape, but other suitable shapes are equally suitable, for example, kidney-shaped, super-elliptical, egg-shaped, hexagonal, rectangular, rectangular with one or two convexly curved sides, or rectangular with rounded corners. Where the tub is equipped with more than two recesses and bottom elements, for example three, the upper edge of the tub may, for example, assume the form of a circle, a trefoil, a triangle, a triangle with rounded corners, a quarter circle or a quarter circle with a rounded corner. In its simplest form, the tub has only one recess and one bottom element.

The above examples require that the recesses with associated bottom elements should lie substantially in the same horizontal plane. The invention, however, is not limited to such embodiments. In a special embodiment the tub may include five recesses with associated bottom elements, four of which are peripherally arranged in a first, upper horizontal plane in a trefoil pattern, with the result that the centres of the recesses form the corners of a square, while the fifth recess is centrally arranged in a second, lower located horizontal plane, symmetrically centred between the first four. A tub of this kind is well-suited to simultaneous use by four people, the first four bottom elements forming seats, while the lower, fifth bottom element forms a central recess for the feet of the bathers. In this case channels have to be provided for transport of fluid, both air and water, between each of the four peripheral recesses and the fifth, central recess. Such channels can involve a risk of the formation of undesirable growth, and it must therefore be made as short as possible, while being sufficiently large in cross section to be easily accessible for mechanical cleaning, e.g. with brushes. In this case a valve

device for both supply of air from a pump device and for emptying water from the tub is mounted in the fifth, central recess.

5 For each embodiment of the tub the bottom elements may advantageously be made of an artificial fibre material, and preferably of a completely or partly transparent material. In the choice of material, account should be taken, amongst other things, of the fact that the bottom elements must be able to withstand the air pressure and changes in the air pressure inside the chambers during repeated start-ups and over a long period, without causing leakages between the bottom elements and the edges 7a, 7b surrounding the recesses 10 2a, 2b. The material must be relatively rigid, so that it does not yield too much under the weight of bathers. When choosing material account should also be taken of the fact that the weight of the bottom elements must not be too great, and naturally the material must be impervious to the fluid used, which usually means waterproof, and be resistant to the fluid and any 15 additives to the fluid. The use of a completely or partly transparent material is not only for aesthetic reasons, but has the technical effect that it makes it easier to observe when the chambers ought to be cleaned. On the basis of these considerations clear or shaded acryl has been found to be a preferred material.

20 Figure 3 illustrates an embodiment of the valve device 11 in closer detail, viewed from side C in fig. 2. The valve device 11 has two functions. It is partly intended to receive a first fluid, normally air, from the inlet 12, illustrated by a dotted circle, and distribute the first fluid to the outlets 10a, 10b for supply to the chambers 8a, 8b. The valve device 11 is also partly 25 intended to act as a drain valve for a second fluid, normally water, from the bathtub 1 to a plug hole 13 for the second fluid. The valve device comprises a housing 22, equipped with a first, essentially horizontal inlet 12 for the first fluid, at least two essentially horizontal outlets 10a, 10b for the first fluid, an upper, vertical inlet for the second fluid, and a lower, vertical plug hole 13 30 for the second fluid. At the plug hole 13 the housing 22 has a conical shape which forms a valve seat. Inside the housing there is mounted a closing device 14 which around a lower part comprises a seal 15, preferably in the form of an O-ring. The closing device 14 is connected to a lifting device 16 which can move the closing device from a closed, lower position to an open, 35 non-illustrated upper position. The lifting device 16 can be operated by a person using the bathtub, by means of known per se, non-illustrated

mechanical transfer devices, for example a linkage rod. The closing device 14 with the seal 15 is arranged to close the plug hole 13 in the closed state, i.e. the lifting device's lower position, thus preventing the passage of the second fluid. In the open state, i.e. the lifting device's upper position, the closing device will permit the second fluid to pass from the bathtub down into the plug hole 13.

The valve device 11 combines the supply and drainage functions for the first and second fluids respectively in a particularly effective manner, where the supply means for the first fluid, normally air, have been made very short. The closing device 14 is vertically removable for cleaning, and when the closing device 14 is removed, easy access is gained to the internal parts of the valve device, including the outlets 10a, 10b, for cleaning, thereby providing easy cleaning and little formation of deposits, growth and so on.

Where the bathtub is provided with more than two recesses with associated bottom elements in the tub part in substantially the same horizontal plane, for example three recesses and three bottom elements, the valve device will have a corresponding number of outlets for the first fluid, arranged in a suitable manner distributed round the circumference of the valve device, with the result that both the outlets and the inlet for the first fluid are as short as possible.

By providing bathtubs of different types with two or more equal-sized recesses, the same type of bottom element can be employed in the different bathtubs. As a result the production of the bottom elements becomes considerably simpler and far more cost-effective than if the bottom elements had a shape adapted to suit the bottom of each type of bathtub.

The requirements regarding precision in the construction of the bottom elements are substantially reduced, since it is far easier to produce bottom elements which are flat than bottom elements which have a high precision in the radial direction. According to the invention it thereby becomes far simpler to achieve an adequate match between the bottom element and the edges surrounding the recesses in the lower bottom. Obtaining a match becomes particularly easy where the bottom elements are circular, where a fixing screw mounted in the centre of the bottom element provides a uniform distribution of force along the circumference, resulting in a uniform, tight

seal. A special advantage of a simple and cost-effective production of the bottom elements is that it is possible to replace the bottom elements with new bottom elements of an alternative design in a simple and inexpensive manner. Such alternative bottom elements may have the same external shape, while  
5 other characteristics such as, for example, number, size, design and/or distribution of nozzle apertures, or characteristics associated with material, surface design or colour, may be different. By providing the bathtub with two or more recesses and bottom elements, the simultaneous advantage is  
10 obtained that a valve device as described gives an efficient distribution of the first fluid to the two chambers under the bottom elements in the tub, with short supply channels. The drawbacks mentioned at the beginning with which previously known solutions are encumbered are thereby avoided.

## PATENT CLAIMS

1. A whirlpool bathtub, comprising a tub part with a bottom which is provided with through-flow apertures for supplying air to water in the whirlpool bathtub, and devices for supplying air to through-flow apertures,  
5 characterized in that the bottom is provided with at least one recess which is flow-relatedly connected with the devices for supply of air, that each recess is surrounded by a substantially horizontal sealing edge, that each recess is covered by a bottom element which abuts sealingly against the recess's sealing edge, with the result that the recess and the bottom element together  
10 form a distributing chamber for air, and that the bottom elements are provided with through-flow apertures for air from the supply chambers to water in the whirlpool bathtub.
2. A whirlpool bathtub according to claim 1,  
characterized in that it comprises at least two identically shaped recesses.
- 15 3. A whirlpool bathtub according to claims 1-2,  
characterized in that the sealing edges and the bottom elements are symmetrical about vertical axes through the central areas of the recesses.
4. A whirlpool bathtub according to claims 1-3,  
characterized in that the sealing edges and the bottom elements are circular.
- 20 5. A whirlpool bathtub according to claims 1-4,  
characterized in that the bottom elements are provided with centrally located attachment devices which act together with corresponding attachment devices in central areas of the recesses.
6. A whirlpool bathtub according to claims 1-5,  
25 characterized in that the bottom elements' through-flow apertures are arranged asymmetrically about the vertical axes.
7. A whirlpool bathtub according to claims 1-6,  
characterized in that the bottom elements are rotatable about the centrally  
located attachment devices, for rotating the bottom elements to a desired  
30 position with regard to the position of the through-flow apertures.



8. A whirlpool bathtub according to claims 2-7, characterized in that the at least two recesses are supplied with air from the same device.

5 9. A whirlpool bathtub according to claims 1-8, characterized in that the device for supply of air is a combined device for supply of air and draining of water.

10 10. A whirlpool bathtub according to claims 1-9, characterized in that  
- the tub part is designed with one recess located in a lower horizontal plane and an additional number of recesses located in an upper horizontal plane, and that  
- each recess which is located in the upper horizontal plane is fluid-relatedly connected with the recess in the lower horizontal plane by a channel.

15 11. A whirlpool bathtub according to claims 1-10, characterized in that the device for supply of air and draining of water is composed of a valve device comprising a housing which is provided with an inlet for air and outlet for air to each of the recesses, an inlet for water from the whirlpool bathtub and an outlet for water to a plug hole, and a valve for closing the outlet for water.

20 12. A valve device for a whirlpool bathtub, for supplying air to the whirlpool bathtub and draining water from the whirlpool bathtub, characterized in that  
- it comprises a valve housing, at least two horizontal outlets for air, a substantially vertical inlet for water and a substantially vertical outlet for water,  
25 - the outlets for air are provided in a plane between the inlet for water and the outlet for water,  
- it comprises a valve for closing the outlet for water, comprising a substantially horizontal valve seat in the housing and a vertically movable closing body which by means of a lifting device is movable between an open  
30 position where water is permitted to flow through the valve device and a closed position where an outlet closing portion of the closing body abuts against the valve seat, closing the outlet for water.

13. A valve device according to claim 12,  
characterized in that the inlet and the outlet for water are substantially  
coaxial.

5 14. A valve device according to claims 12-13,  
characterized in that the closing body also comprises an inlet closing portion  
adapted for closing or substantially closing the inlet for water.

10 15. A valve device according to claims 12-14,  
characterized in that the closing body is substantially in the form of two  
truncated cones with the narrow ends facing each other, the outlet closing  
portion being provided in the wide end of a lower cone and the inlet closing  
portion being provided in the wide end of an upper cone, and the area with  
the cones' narrow ends is arranged for the passage of air to the recesses when  
the valve device is located in the closed position.

Fig. 1

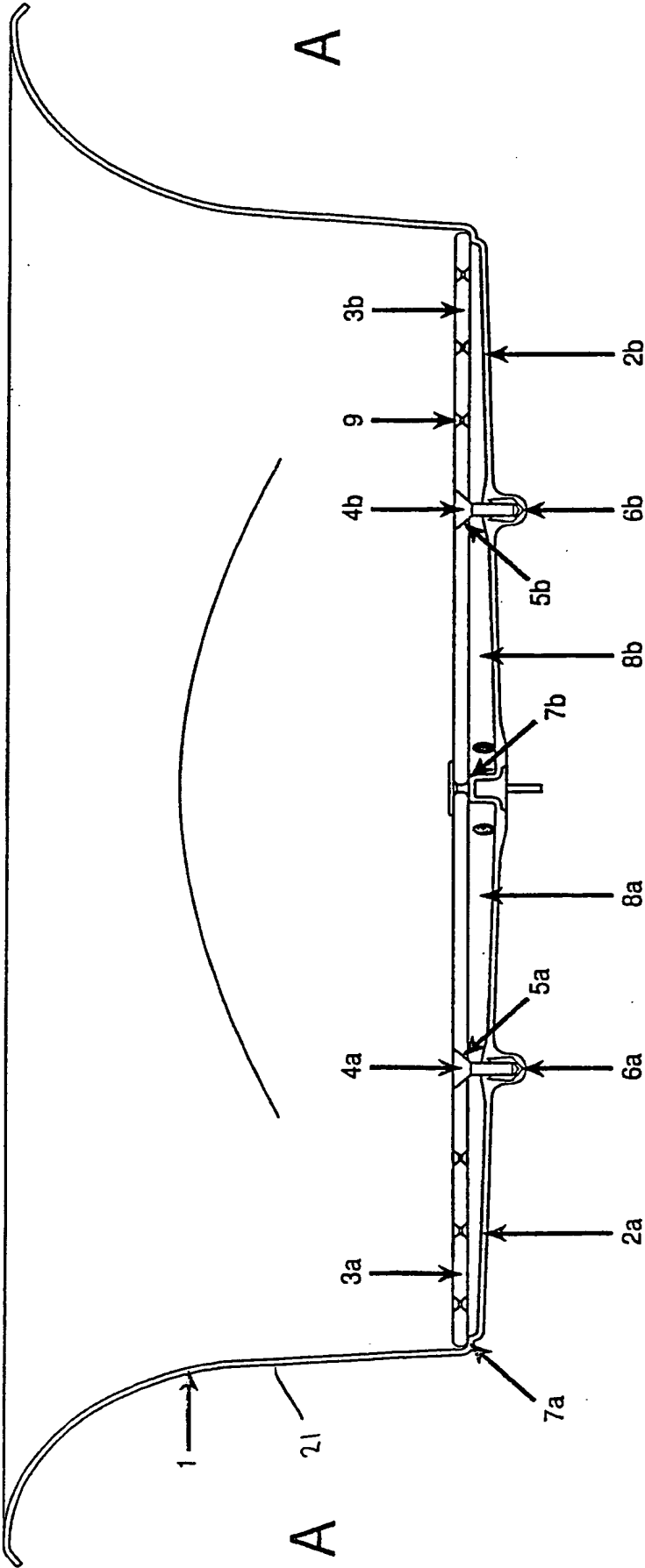


Fig. 2

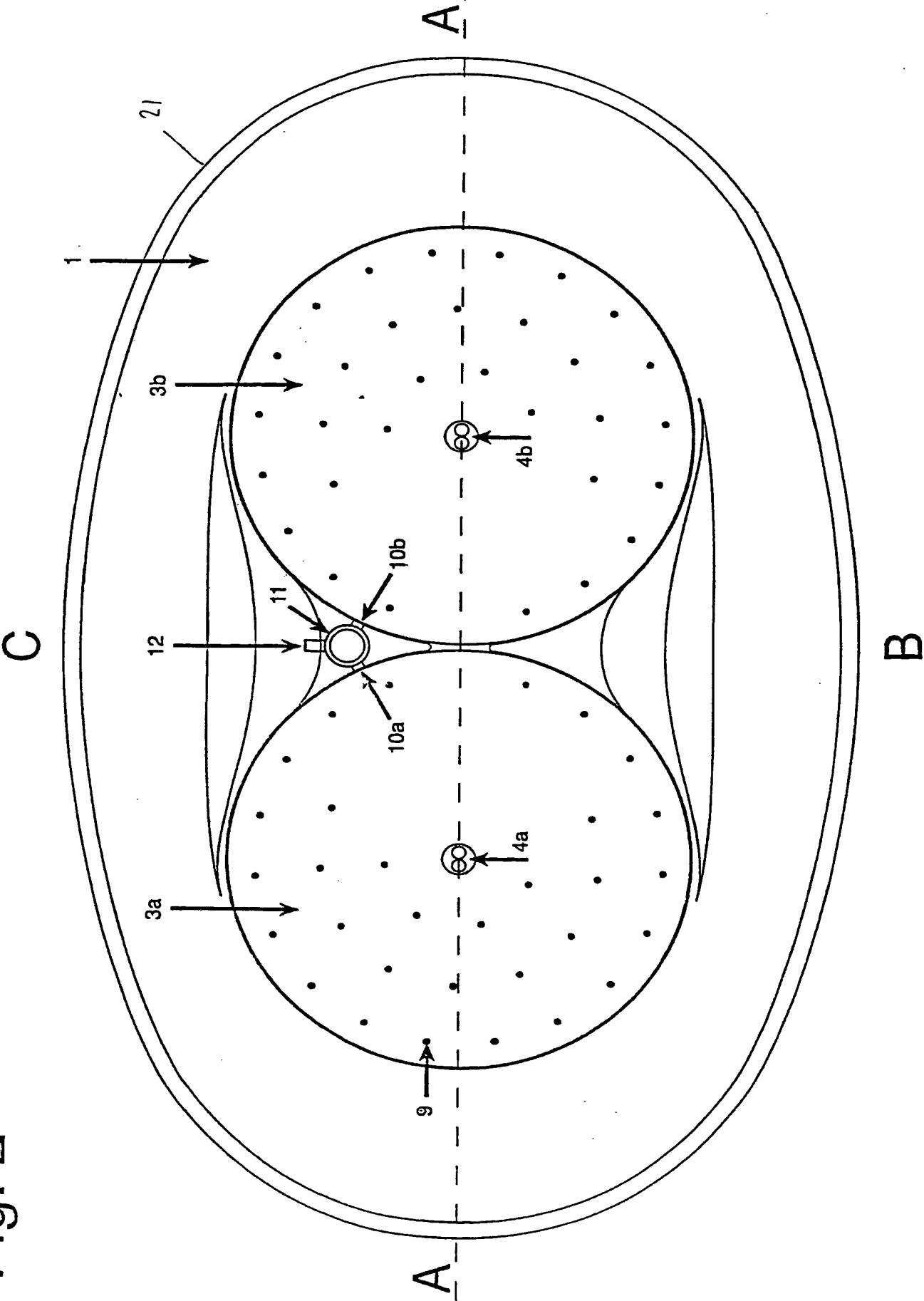
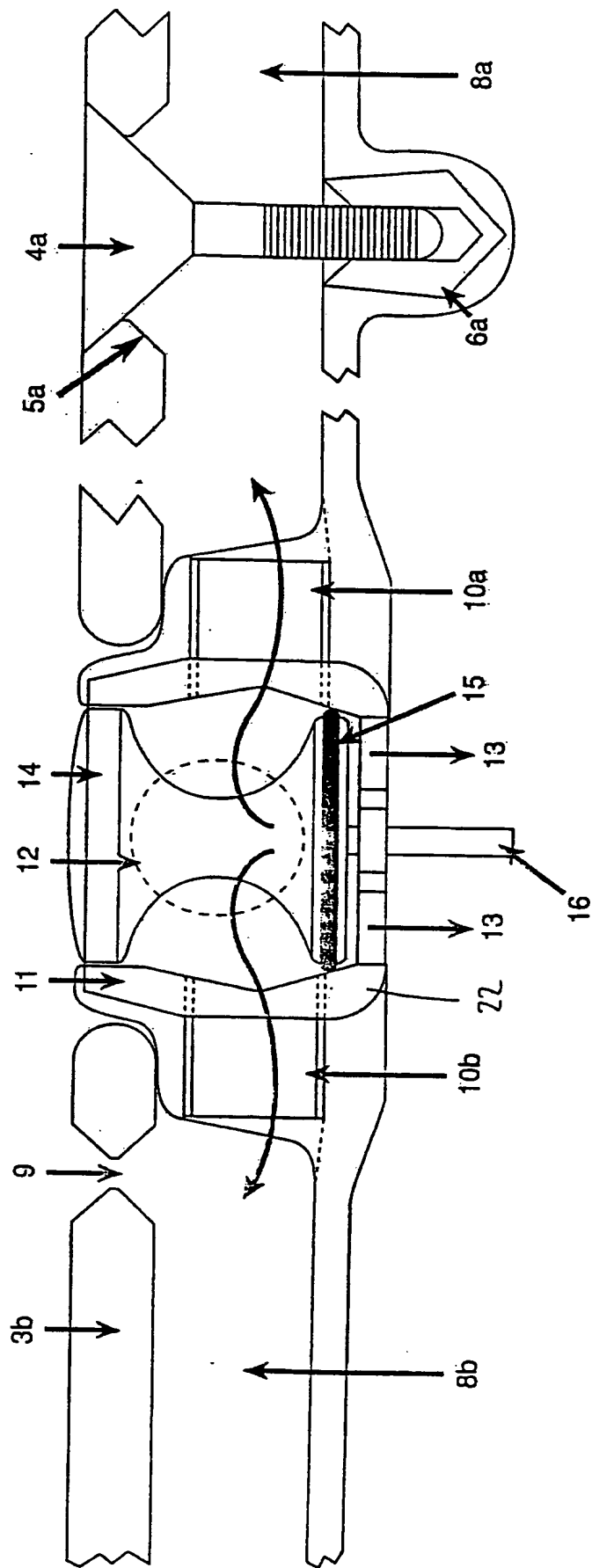


Fig. 3



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 00/00307

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A61H 33/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61H, F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NO 301031 B (VICO PRODUCTS MFG. CO AS), 1 Sept 1997 (01.09.97), figures 1-3, claims 1-10 --	1-11,12-15
A	GB 2288975 A (TROJAN PLASTICS LIMITED), 8 November 1995 (08.11.95), figures 1-7, claims 1-17 --	1-11,12-15
A	EP 0450396 A1 (SCHYDLO, MARTIN T.), 9 October 1991 (09.10.91), figures 1-7, claims 1-18 --	1-11,12-15
A	DE 2602472 A1 (SIERANT, STANLEY LESLIE), 29 July 1976 (29.07.76), figures 1-5, claims 1-11 -- -----	1-11,12-15

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

27 November 2000

Date of mailing of the international search report

12-12-2000

Name and mailing address of the ISA/

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

02/11/00

International application No.

PCT/NO 00/00307

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
NO	301031	B	01/09/97	AT	145030 T	15/11/96
				AU	1547992 A	17/11/92
				CA	2107785 A	10/10/92
				DE	69215081 D,T	10/04/97
				EP	0579678 A,B	26/01/94
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				WO	9218712 A	29/10/92
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				DE	59100543 D	00/00/00
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DE	2602472	A1	29/07/76	CH	607908 A	15/12/78
				FR	2298302 A,B	20/08/76
				GB	1550361 A	15/08/79
				IT	1056595 B	20/02/82
				SE	7600681 A	26/07/76
-----						

tool in the form of a lifting ring. This cumbersome process has in many cases led to a tendency for the tub not to be cleaned as often and as thoroughly as was intended.

5 A further drawback with the known solution is that the bottom element will require a fixed, predetermined distribution of air apertures over the surface of the bottom element. This offers no opportunity for a user to select and vary the areas which will be provided with air apertures, and which areas will not.

10 The known solution also makes it difficult and expensive to replace the bottom element with another, if it is desirable to alter certain characteristics such as the number, size and distribution of air apertures for the bottom element.

The object of the present invention is to provide a whirlpool bathtub as mentioned in the introduction, which is not encumbered by the above disadvantages.

15 The object is achieved with a whirlpool bathtub and a valve device of the type mentioned in the introduction, which are characterized by the features which are indicated in the claims.

The invention will now be described in more detail with reference to the drawings, in which

20 fig. 1 illustrates a cross section of a bathtub according to the invention, taken along the intersecting line A-A in fig. 2,

fig. 2 is a top view of a bathtub according to the invention, and

fig. 3 illustrates a valve device for use with a bathtub according to the invention.

25 Figure 1 illustrates a cross section of a bathtub 1 according to the invention. The tub 1 consists of a tub part 21 comprising walls and a bottom 2 with two recesses 2a and 2b. Each recess is bounded and surrounded by a preferably rounded edge or rim, designated by 7a and 7b respectively, each of which has at least one substantially horizontal, upper portion. The substantially  
30 horizontal portion advantageously has a width in the horizontal direction in the range of 3 mm to 10 mm, and specially preferred around 5 mm.



## PATENT CLAIMS

1. A whirlpool bathtub, comprising a tub part with a bottom which is provided with through-flow apertures for supplying air to water in the whirlpool bathtub, and devices for supplying air to through-flow apertures,  
5 characterized in that the bottom is provided with at least one recess which is flow-relatedly connected with the devices for supply of air, that each recess is surrounded by a substantially horizontal sealing edge, that each recess is covered by a bottom element which abuts sealingly against the recess's sealing edge, with the result that the recess and the bottom element together  
10 form a distributing chamber for air, and that the bottom elements are provided with through-flow apertures for air from the supply chambers to water in the whirlpool bathtub.
2. A whirlpool bathtub according to claim 1, characterized in that it comprises at least two identically shaped recesses.
- 15 3. A whirlpool bathtub according to claims 1-2, characterized in that the sealing edges and the bottom elements are symmetrical about vertical axes through the central areas of the recesses.
4. A whirlpool bathtub according to claims 1-3, characterized in that the sealing edges and the bottom elements are circular.
- 20 5. A whirlpool bathtub according to claims 1-4, characterized in that the bottom elements are provided with centrally located attachment devices which act together with corresponding attachment devices in central areas of the recesses.
6. A whirlpool bathtub according to claims 1-5,  
25 characterized in that the bottom elements' through-flow apertures are arranged asymmetrically about the vertical axes.
7. A whirlpool bathtub according to claims 1-6,  
30 characterized in that the bottom elements are rotatable about the centrally located attachment devices, for rotating the bottom elements to a desired position with regard to the position of the through-flow apertures.

8. A whirlpool bathtub according to claims 2-7, characterized in that the at least two recesses are supplied with air from the same device.

5 9. A whirlpool bathtub according to claims 1-8, characterized in that the device for supply of air is a combined device for supply of air and draining of water.

10. A whirlpool bathtub according to claims 1-9, characterized in that

- 10 - the tub part is designed with one recess located in a lower horizontal plane and an additional number of recesses located in an upper horizontal plane, and that
- each recess which is located in the upper horizontal plane is fluid-relatedly connected with the recess in the lower horizontal plane by a channel.

15 11. A whirlpool bathtub according to claims 1-10, characterized in that the device for supply of air and draining of water is composed of a valve device comprising a housing which is provided with an inlet for air and outlet for air to each of the recesses, an inlet for water from the whirlpool bathtub and an outlet for water to a plug hole, and a valve for closing the outlet for water.

20 12. A valve device for a whirlpool bathtub, for supplying air to the whirlpool bathtub and draining water from the whirlpool bathtub, characterized in that

- 25 - it comprises a valve housing, at least two horizontal outlets for air, a substantially vertical inlet for water and a substantially vertical outlet for water,
- the outlets for air are provided in a plane between the inlet for water and the outlet for water,
- 30 - it comprises a valve for closing the outlet for water, comprising a substantially horizontal valve seat in the housing and a vertically movable closing body which by means of a lifting device is movable between an open position where water is permitted to flow through the valve device and a closed position where an outlet closing portion of the closing body abuts against the valve seat, closing the outlet for water.

13. A valve device according to claim 12, characterized in that the inlet and the outlet for water are substantially coaxial.


5 14. A valve device according to claims 12-13, characterized in that the closing body also comprises an inlet closing portion adapted for closing or substantially closing the inlet for water.

10 15. A valve device according to claims 12-14, characterized in that the closing body is substantially in the form of two truncated cones with the narrow ends facing each other, the outlet closing portion being provided in the wide end of a lower cone and the inlet closing portion being provided in the wide end of an upper cone, and the area with the cones' narrow ends is arranged for the passage of air to the recesses when the valve device is located in the closed position.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

12

Applicant's or agent's file reference 112367Fjo1/sko		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/NO00/00307	International filing date (day/month/year) 19/09/2000	Priority date (day/month/year) 20/09/1999	
International Patent Classification (IPC) or national classification and IPC A61H33/02			
Applicant FJORDBAD AS et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 5 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the report</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV <input checked="" type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input type="checkbox"/> Certain documents cited</li> <li>VII <input type="checkbox"/> Certain defects in the international application</li> <li>VIII <input type="checkbox"/> Certain observations on the international application</li> </ul>			
Date of submission of the demand  06/04/2001		Date of completion of this report  25.01.2002	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 23399 - 0 Tx: 523656 epmu d Fax: +49 89 23399 - 4465		Authorized officer  Georgiou, Z  Telephone No. +49 89 23399 2334	



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/NO00/00307

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, pages:

1,2,4-10 as originally filed

3,3a as received on 22/11/2001 with letter of 15/11/2001

### Claims, No.:

1-13 as received on 22/11/2001 with letter of 15/11/2001

### Drawings, sheets:

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/NO00/00307

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-13
	No: Claims

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/NO00/00307**

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Inventive step (IS)	Yes:	Claims	1-13
	No:	Claims	

Industrial applicability (IA)	Yes:	Claims	1-13
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

**Re Item IV**

**Lack of unity of invention**

1. The present Application does not fulfil the requirements of Unity of Invention (Rule 13.1 PCT). The subject-matters of claim 1 on the one hand and of claim 10 on the other are not so linked as to form a single general inventive concept.  
Claim 1 relates to a whirlpool-bathtub with a recess covered by a bottom element symmetrical about vertical axes and provided with centrally located attachment devices and with apertures sealingly seated on the recess whereas  
Claim 10 relates to a valve with two air outlets (not necessarily an air inlet), a water inlet and a water outlet and a valve body for closing the water outlet, the valve having a particular geometry.  
These two groups of inventions also solve a different technical problem (access for mechanical cleaning - short tubing lengths).  
Thus, these two subject-matters do not fulfil the requirements of unity of Rule 13 PCT.

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. The subject-matter of Claim 1 relates to a whirlpool bathtub having a recess covered by a bottom element.
2. The closest prior art document is EP-A-0 450 396 (D1), which discloses (column 5, lines 13-39, column 6, lines 13-16 and 27-53, figures 1-2, 5- 7) a whirlpool bathtub according to the preamble of Claim 1.
3. By the features of the sealing edges and the bottom elements being symmetrical about vertical axes along with the centrally located attachment devices for the bottom elements the use of additional sealing elements may be avoided such that hygiene will be augmented and also cleaning will be easier.  
Claim 1 thus, appears to fulfil the requirements of Art. 33(2) and 33(3) PCT.
4. Claims 2-9 relate to preferred embodiments of the subject-matter of Claim 1 and



thus they also fulfil the requirements of Art. 33(2) and 33(3) PCT.

5. Also the subject-matter of Claim 10 cannot be rendered obvious in view of the available prior art as reflected by the documents of the search report.
6. Claim 10 relates to a valve having two air outlets, a water inlet and a water outlet acting a drain, along with a valve member to close the water outlet actuatable via a lifting device.
7. The closest prior art document is GB-A-2 217 986 (D2). By the features of the second air outlet and of the particular geometrical configuration of the two air outlets in relation to the water inlet and outlet the claimed device can also act as an air-flow distributor to feed different parts of a whirlpool with pressurised air. A second air outlet is not disclosed in any of the documents of the search report and the skilled practitioner would also have no incentive to use one. Claim 12 hence appears to fulfil the requirements of Art. 33(2) and 33(3) PCT.
8. Claims 11-13 relate to preferred embodiments of the valve of Claim 12 and thus they also fulfil the requirements of Art. 33(2) and 33(3) PCT.
9. The industrial applicability of the subject-matter of Claims 1-13 is self-evident. Hence the claims appear to fulfil also the requirements of Art. 33(4) PCT.

tool in the form of a lifting ring. This cumbersome process has in many cases led to a tendency for the tub not to be cleaned as often and as thoroughly as was intended.

5 A further drawback with the known solution is that the bottom element will require a fixed, predetermined distribution of air apertures over the surface of the bottom element. This offers no opportunity for a user to select and vary the areas which will be provided with air apertures, and which areas will not.

10 The known solution also makes it difficult and expensive to replace the bottom element with another, if it is desirable to alter certain characteristics such as the number, size and distribution of air apertures for the bottom element.

15 EP-A-0 450 396 discloses a device for use with a bathtub, where a mixture of air and water is supplied to the water in the bathtub by means of an external pump. The bathtub bottom is provided with a recess, delimited at the top by a cover, constituting a chamber which is further divided into sections for feeding air/water mixture and for return of water, respectively. The cover is detachable by means of clips. Apparently, the publication does not address the problem of simultaneously providing satisfactorily sealing, effective and convenient cleaning, simple manufacturing and preventing the growth of bacteria etc.

20 GB-A-2 217 986 discloses a drainage valve for a whirlpool tub, arranged for simultaneously draining of the bathtub and associated pipework. The publication does not address the problem of providing a valve for both supplying air into the bathtub and draining water from the bathtub. 25 Particularly, the publication does not disclose a special valve geometry which provides for short tubing lengths, thereby facilitating easy access and convenient cleaning.

30 The object of the present invention is to provide a whirlpool bathtub and a valve device as mentioned in the introduction, which is not encumbered by the above disadvantages.

The object is achieved with a whirlpool bathtub and a valve device of the type mentioned in the introduction, which are characterized by the features which are indicated in the claims.

The invention will now be described in more detail with reference to the drawings, in which

fig. 1 illustrates a cross section of a bathtub according to the invention, taken along the intersecting line A-A in fig. 2,

5 fig. 2 is a top view of a bathtub according to the invention, and

fig. 3 illustrates a valve device for use with a bathtub according to the invention.

Figure 1 illustrates a cross section of a bathtub 1 according to the invention. The tub 1 consists of a tub part 21 comprising walls and a bottom 2 with two  
10 recesses 2a and 2b. Each recess is bounded and surrounded by a preferably rounded edge or rim, designated by 7a and 7b respectively, each of which has at least one substantially horizontal, upper portion. The substantially  
horizontal portion advantageously has a width in the horizontal direction in the range of 3 mm to 10 mm, and specially preferred around 5 mm.

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## PATENT CLAIMS

1. A whirlpool bathtub (1), comprising
  - a tub part with a bottom which is provided with through-flow apertures for supplying air to water in the whirlpool bathtub, and devices for supplying air to through-flow apertures, wherein
  - the bottom (2) is provided with at least one recess (2a, 2b) which is flow-relatedly connected with the devices for supply of air,
  - each recess (2a, 2b) is surrounded by a substantially horizontal sealing edge (7a, 7b),
  - each recess (2a, 2b) is covered by a bottom element (3a, 3b) which abuts sealingly against the recess's sealing edge (7a, 7b), the recess and the bottom element together forming a distributing chamber (8a, 8b) for air, and
  - the bottom elements (3a, 3b) are provided with through-flow apertures (9) for air from the supply chambers (8a, 8b) to water in the whirlpool bathtub, characterised in
  - that the sealing edges (7a, 7b) and the bottom elements (3a, 3b) are symmetrical about vertical axes through the central areas of the recesses, and
  - that the bottom elements (3a, 3b) are provided with centrally located attachment devices (4a, 4b) which act together with corresponding attachment devices (6a, 6b) in central areas of the recesses.
2. A whirlpool bathtub according to claim 1, characterized in that it comprises at least two identically shaped recesses (2a, 2b).
3. A whirlpool bathtub according to claims 1-2, characterized in that the sealing edges (7a, 7b) and the bottom elements (3a, 3b) are circular.
4. A whirlpool bathtub according to claims 1-3, characterized in that the bottom elements' through-flow apertures (9) are arranged asymmetrically about the vertical axes.
5. A whirlpool bathtub according to claims 1-4, characterized in that the bottom elements (3a, 3b) are rotatable about the centrally located attachment devices (4a, 4b), for rotating the bottom

elements to a desired position with regard to the position of the through-flow apertures (9).

6. A whirlpool bathtub according to claims 2-7,  
characterized in that the at least two recesses (2a, 2b) are supplied with air  
5 from the same device.

7. A whirlpool bathtub according to claims 1-6,  
characterized in that the device for supply of air is a combined device (11)  
for supply of air and draining of water.

8. A whirlpool bathtub according to claims 1-7,  
10 characterized in that  
- the tub part is designed with one recess located in a lower horizontal plane  
and an additional number of recesses located in an upper horizontal plane,  
and that  
- each recess which is located in the upper horizontal plane is fluid-relatedly  
15 connected with the recess in the lower horizontal plane by a channel.

9. A whirlpool bathtub according to claims 1-8,  
characterized in that the device (11) for supply of air and draining of water is  
composed of a valve device comprising a housing (22) which is provided  
with an inlet (12) for air and outlet (10a, 10b) for air to each of the recesses,  
20 an inlet for water from the whirlpool bathtub and an outlet (13) for water to a  
plug hole, and a valve for closing the outlet for water.

10. A valve device (11) for a whirlpool bathtub, for supplying air to the  
whirlpool bathtub and draining water from the whirlpool bathtub,  
characterized in that  
25 - it comprises a valve housing, at least two horizontal outlets (10a, 10b) for  
air, a substantially vertical inlet for water and a substantially vertical outlet  
(13) for water,  
- the outlets (10a, 10b) for air are provided in a plane between the inlet for  
water and the outlet (13) for water,  
30 - it comprises a valve for closing the outlet (13) for water, comprising a  
substantially horizontal valve seat in the housing and a vertically movable  
closing body (14) which by means of a lifting device (16) is movable  
between an open position where water is permitted to flow through the valve

device and a closed position where an outlet closing portion of the closing body abuts against the valve seat, closing the outlet for water.

11. A valve device according to claim 10,  
characterized in that the inlet and the outlet for water are substantially  
5 coaxial.

12 A valve device according to claims 10-11,  
characterized in that the closing body (14) also comprises an inlet closing  
portion adapted for closing or substantially closing the inlet for water.

13. A valve device according to claims 10-12,  
10 characterized in that the closing body (14) is substantially in the form of two  
truncated cones with the narrow ends facing each other, the outlet closing  
portion being provided in the wide end of a lower cone and the inlet closing  
portion being provided in the wide end of an upper cone, and the area with  
the cones' narrow ends is arranged for the passage of air to the recesses when  
15 the valve device is located in the closed position.